

A SYNOPSIS OF THE FORMICIDAE OF NORTH EUROPE

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The North European Formicidae are limited in number of species; their distribution, morphological characteristics and variation are reasonably well known. A number of revisionary and distributional works of more or less local character have been produced in recent years but there is no up to date comparative list available for the countries of North Europe with the exception of the Scandinavian countries where Forsslund (1957) assembled the known information at that date for Sweden and its adjacent countries. Such lists are of considerable value and interest since they draw together information otherwise scattered in a large number of journals.

In this paper a species list is presented from the known records for European countries whose main areas are situated north of latitude 50°. This latitude has been arbitrarily selected so as to include the British Isles, Belgium, Netherlands, the Northern half of Germany, Poland, the Baltic States of Estonia, Latvia and Lithuania, but not other areas of the U.S.S.R., Finland and the Scandinavian countries. The chief sources of information for each country are as follows:—British Isles, Collingwood and Barrett, 1964; Belgium, Bondroit, 1918, Gasper *pers. commun.* 1966; Netherlands, Staercke, 1944, Boven, 1959; N. Germany, Stitz, 1939, Wolf, 1949, Gösswald, 1951; Poland, Kulmatycki, 1920, Pisarski, 1953, 1961, Petal, 1963; Baltic States, Jacobson, 1949; Denmark, Larssen, 1943, Bisgaard, 1944, Collingwood, 1961; Norway, Holgersen, 1942, 1944, Collingwood, 1963; Sweden, Forsslund, 1957, Collingwood, 1961; Finland, Forsslund, 1957, Hölldobler, 1961, Collingwood, 1962. The most recent comprehensive or revisionary works are quoted under each species, followed by brief notes on its general distribution with any controversial matter on nomenclature brought out for quick reference.



Figure 1 gives the area covered by the species lists. Some contrasted species ranges are superimposed as follows:—

- G=*Formica gagatoides* Ruzs. Southern limits
- R=*Formica rufibarbis* Fab. Northern limits
- C=*Formica cinerea* Mayr. Northern limits
- W=*Stegomyia westwoodii* Westw. Northern limits
- S=*Myrmica speciosoides* Bond. Northern limits

SPECIES DISTRIBUTION IN NORTH EUROPE

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LAT. 50-55

LAT. 56-60

LAT. 61-65

LAT. 66-70

| | N. NORWAY | N. SWEDEN | N. FINLAND | C. NORWAY | C. SWEDEN | S. FINLAND | SCOTLAND | S. NORWAY | S. SWEDEN | DENMARK | E. BALTIC | IRELAND | ENGLAND & WALES | BELGIUM | NETHERLANDS | N. GERMANY | POLAND |
|--|-----------|-----------|------------|-----------|-----------|------------|----------|-----------|-----------|---------|-----------|---------|-----------------|---------|-------------|------------|--------|
| 1. <i>P. constricta</i> | | | | | | | | | | | | | | | | | |
| 2. <i>M. rubra</i> | | | | | | | | | | | | | | | | | |
| 3. <i>Myrmica rubra</i> | | | | | | | | | | | | | | | | | |
| 4. <i>M. ruginodis</i> | | | | | | | | | | | | | | | | | |
| 5. <i>M. ruginodis</i> (var. <i>microgyna</i>) | | | | | | | | | | | | | | | | | |
| 6. <i>M. ruginodis</i> | | | | | | | | | | | | | | | | | |
| 7. <i>M. jacobsoni</i> | | | | | | | | | | | | | | | | | |
| 8. <i>M. speciosus</i> | | | | | | | | | | | | | | | | | |
| 9. <i>M. scabrinodis</i> | | | | | | | | | | | | | | | | | |
| 10. <i>M. sabuleti</i> | | | | | | | | | | | | | | | | | |
| 11. <i>M. schenckii</i> | | | | | | | | | | | | | | | | | |
| 12. <i>M. lobicornis</i> | | | | | | | | | | | | | | | | | |
| 13. <i>Aphaenogaster subterranea</i> | | | | | | | | | | | | | | | | | |
| 14. <i>Stenamma westwoodii</i> | | | | | | | | | | | | | | | | | |
| 15. <i>Anergates atratulus</i> | | | | | | | | | | | | | | | | | |
| 16. <i>Soenopis fugar</i> | | | | | | | | | | | | | | | | | |
| 17. <i>Myrmica graminicola</i> | | | | | | | | | | | | | | | | | |
| 18. <i>Silvius</i> sp. | | | | | | | | | | | | | | | | | |
| 19. <i>Formicoreus nitidulus</i> | | | | | | | | | | | | | | | | | |

*Ponera punctatissima*1. *P. constricta*2. *M. rubra*3. *Myrmica rubra*4. *M. ruginodis*(var. *microgyna*)5. *M. ruginodis*6. *M. ruginodis*7. *M. jacobsoni*8. *M. speciosus*9. *M. scabrinodis*10. *M. sabuleti*11. *M. schenckii*12. *M. lobicornis*13. *Aphaenogaster subterranea*14. *Stenamma westwoodii*15. *Anergates atratulus*16. *Soenopis fugar*17. *Myrmica graminicola*18. *Silvius* sp.19. *Formicoreus nitidulus*

SPECIES DISTRIBUTION IN NORTH EUROPE (continued)

| | LAT. 66-70 | LAT. 61-65 | LAT. 56-60 | LAT. 50-55 | |
|--------------------------------|------------|------------|------------|------------|-----------------|
| N. NORWAY | | | | | NORWAY |
| N. SWEDEN | | | | | N. SWEDEN |
| N. FINLAND | | | | | N. FINLAND |
| C. NORWAY | | | | | C. NORWAY |
| C. SWEDEN | | | | | C. SWEDEN |
| S. FINLAND | | | | | S. FINLAND |
| SCOTLAND | | | | | SCOTLAND |
| S. NORWAY | | | | | S. NORWAY |
| S. SWEDEN | | | | | S. SWEDEN |
| DENMARK | | | | | DENMARK |
| E. BALTIC | | | | | E. BALTIC |
| IRELAND | | | | | IRELAND |
| ENGLAND & WALES | | | | | ENGLAND & WALES |
| BELGIUM | | | | | BELGIUM |
| NETHERLANDS | | | | | NETHERLANDS |
| N. GERMANY | | | | | N. GERMANY |
| POLAND | | | | | POLAND |
| 38. <i>C. nigripes</i> | | | | | |
| 39. <i>C. vagus</i> | | | | | |
| 40. <i>C. lateralis</i> | | | | | |
| 41. <i>C. picea</i> | | | | | |
| 42. <i>C. cedhonia</i> | | | | | |
| 43. <i>Coelopsis truncata</i> | | | | | |
| 44. <i>Pegionopsis pygmaea</i> | | | | | |
| 45. <i>P. rindobonensis</i> | | | | | |
| 46. <i>Lasius niger</i> | | | | | |
| 47. <i>L. alienus</i> | | | | | |
| 48. <i>L. esargiacus</i> | | | | | |
| 49. <i>L. brunneus</i> | | | | | |
| 50. <i>L. pictus</i> | | | | | |
| (<i>v. mops</i>) | | | | | |
| 51. <i>L. umbratus</i> | | | | | |
| 52. <i>L. rabeaudi</i> | | | | | |
| 53. <i>L. bicornis</i> | | | | | |
| 54. <i>L. citrinus</i> | | | | | |
| 55. <i>L. rufus</i> | | | | | |
| 56. <i>L. carolinicus</i> | | | | | |
| 57. <i>L. fuliginosus</i> | | | | | |

SPECIES DISTRIBUTION IN NORTH EUROPE (continued)

LAT. 66-70 LAT. 61-65 LAT. 56-60 LAT. 50-55 THE ENTOMOLOGIST 1971] 155

| | N. NORWAY | N. SWEDEN | N. FINLAND | C. NORWAY | C. SWEDEN | S. FINLAND | SCOTLAND | S. NORWAY | S. SWEDEN | DENMARK | F. BAL TIC | IRELAND | ENGLAND & WALES | BELGIUM | NETHERLANDS | N. GERMANY | POLAND |
|-----------------------------|-----------|-----------|------------|-----------|-----------|------------|----------|-----------|-----------|---------|------------|---------|-----------------|---------|-------------|------------|--------|
| <i>Formica exsecta</i> | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| <i>F. prestidioris</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. suetica</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. forsslundi</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. sanguinea</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. urticae</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. truncorum</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. rufa</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. polyctena</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. aquilonia</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. lugubris</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. pratensis</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. nigricans</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. fusca</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. lemmonii</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. rufibarbis</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. cunicularia</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| (var. <i>rufescens</i>) | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. cinerea</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. cinereorufibarbis</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. gaguroides</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>F. transcaucasica</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| <i>Polyergus rufescens</i> | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| Total spp. | 17 | 17 | 21 | 29 | 41 | 38 | 20 | 37 | 55 | 39 | 40 | 20 | 40 | 47 | 47 | 60 | 62 |

NOTES ON THE SPECIES

PONERINAE

Hypoponera punctatissima (Roger 1859)

Donisthorpe, 1927; Stitz, 1939; Taylor, 1967.

This is a widely distributed cosmopolitan species of uncertain provenance although Taylor (1967) considers that no member of this recently erected genus (Taylor, *op. cit.*) is autochthonous in Europe. However, it is listed here although not included in the total of native North European species because it has at times been found outside heated premises and indeed both Holgersen (1942) and Donisthorpe (1927) thought that it might be an indigenous relict species in North Europe. However, outside colonies have nearly always been found associated with heated rubbish dumps; Stradling (1965) describes such a site in Derbyshire on coffee waste, and Yarrow (1967) discusses its occurrence in numbers deep in a Kentish coalmine.

Ponera coarctata (Latreille, 1802)

Donisthorpe, 1927; Stitz, 1939.

P. coarctata increases in abundance southwards to the Mediterranean area. It reaches its northward limits in the British Isles and the Netherlands and does not occur in Scandinavia.

MYRMICINAE

Manica rubida (Latreille, 1802)

(*Myrmica* (*Neomyrma*) *rubida* Latr.); Stitz, 1939.

Manica rubida is essentially a species of the mountains of Central Europe although sometimes occurring on quite low ground. Unlike many other such mountain species it is not found at all in Scandinavia or West Europe.

Myrmica rubra (Linnaeus, 1758)

Yarrow, 1955; Collingwood, 1958.

syn. *M. laevinodis* Nylander, 1846.

Myrmica rubra has to be accepted as the proper name for the species long known as *M. laevinodis* (Yarrow, 1955). It is widely distributed and common throughout Eurosiberia from warm coastal districts near the Arctic Circle (Collingwood, 1958) to Central Spain and the Mediterranean.

Myrmica ruginodis Nylander, 1846

syn. *M. rubra* auctt.

Brian and Brian, 1949; Sadil, 1951.

Yarrow, 1955; Collingwood, 1958.

M. ruginodis var. *microgyna* Brian and Brian, 1949, 1955

Collingwood, 1958.

M. ruginodis is one of the commonest ants of North Europe.

It exists in two forms in the British Isles and Scandinavia which were described as var. *macrogyna* and *microgyna* Brian and Brian (1949) respectively. The macrogynous form is the common species throughout North and Central Europe while '*microgyna*' tends to become abundant in coastal areas. There is no morphological distinction between them other than size and at the same time some suggestion of overlap, and they must on present evidence be treated as one species (Collingwood, 1958).

Myrmica sulcinodis Nylander, 1846

syn. *M. sulcinodis* var. *nigripes* Ruzsky, 1896.

Stitz, 1939; Sadil, 1951; Collingwood, 1958.

M. sulcinodis is a mountain species but also characteristic of the drier moors of North Europe where it is common.

Myrmica rugulosa Nylander, 1849

Stitz, 1939; Sadil, 1951.

M. rugulosa is widely distributed through Europe, extending as far north as Sweden and Finland but does not occur in the British Isles.

Myrmica jacobsoni Kutter, 1963

syn. *M. bergi* Sadil, 1951.

Kutter, 1963; Collingwood, 1969.

M. jacobsoni is an interesting species, named from material collected in the Baltic States by the late Dr H. Jacobson and discovered also in some abundance on the sand dunes near Rødby in Denmark (Collingwood in press). *M. bergi* sensu Sadil (1951) in Czechoslovakia appears to be the same species and it is also very similar to *M. limanica* Arnoldi (1934) from the Ukrainian salt marshes. It is possibly the same as, and therefore a synonym of, *M. gallieni* Bondroit. Named specimens of workers and queens from Latrecy and Saône, France, in the Bondroit collection certainly appear very similar.

Myrmica specioides Bondroit, 1918

syn. *M. scabrinodis* v. *rugulosoides* sensu Emery, 1908.

syn. *M. puerilis* Staercke, 1942; Wolf, 1949; Collingwood, 1962.

syn. *M. balcanina* Sadil, 1951; Collingwood, 1969.

M. specioides is considered to be the correct name for *M. puerilis* (Staercke, 1942; Collingwood, 1962; Felton, 1968), and *M. balcanina* Sadil (1951). This species is most easily recognised in the male caste. It appears to extend rather sporadically from Russia and the Adriatic to Spain and the South-eastern tip of England. Bondroits named 'type' material is from Calais, St. Afrique and Paris (Collingwood in press).

Myrmica scabrinodis Nylander, 1846

Sadil, 1951; Collingwood, 1958, 1962.

syn. *M. scabrinodis* v. *rugulosoides*

Forel, 1915; Sadil, 1951; Kutter, 1953; nec Petal, 1964.

M. scabrinodis varies in form and colour according to habitat with large dark specimens frequently found towards the northern limits of its range and on boggy moorland. Such examples were named *M. pilosiscapa* by Bondroit (1918) and redescribed from similar material under this name by Sadil (1951). Petal (1962) has used the name *rugulosoides* Forel for the same form in Polish bogs but as Kutter (1963) points out, her descriptions do not quite match Forel's types. In all these forms of *M. scabrinodis* the males have constant characteristics including a short thick scape and profuse long body and appendage hairs. The relatively minute differences suggested by Sadil on the one hand between *pilosiscapa* and *scabrinodis* and those suggested by Petal between *rugulosoides* and *scabrinodis* on the other are of a quite different order to the large distinctions between the males of each and every species accepted as such in the present list.

Myrmica sabuleti Meinert, 1860syn. *M. sabuleti* var. *lonae*, Finzi, 1926.

Sadil, 1951; Collingwood, 1958.

M. sabuleti is another common and variable species. The Scandinavian population tends to have enormous scape lobes in the female castes compared with those from southwest Europe, and there is a suggestion of a clinal trend in this character from N.E. to S.W.

Myrmica schencki Emery, 1895

Sadil, 1951; Collingwood, 1958.

M. schencki is of very consistent form throughout its northern range from Ireland to Finland but becomes more variable in Central Europe.

Myrmica lobicornis Nylander, 1846

Sadil, 1951; Collingwood, 1958.

M. lobicornis is perhaps the most variable of all European *Myrmica* with quite considerable differences in the scape lobe, shape of petiole node and head proportions. Despite the numerous varieties named in the literature, there is no good evidence for division into separate races or species. As with *M. sabuleti* the lobar development of the antennal scape process is very large in Scandinavian examples and correspondingly minute in British and Western Europe populations, but this and other character variations seem to be somewhat randomly combined throughout the range of the species.

Aphaenogaster subterranea (Latreille, 1798)

Stitz, 1939.

A. subterranea does not belong to the North European fauna but Gösswald (1951) found it in sheltered valleys extending northward into the area arbitrarily selected for the purposes of this paper.

Stenammas westwoodii Westwood, 1840syn. *S. westwoodii* r. *polonica* Begdon, 1931.

Stitz, 1939.

S. westwoodii has a rather similar distribution to *Ponera coarctata* but more northern extending into South Sweden and also westward into Ireland.

Anergates atratulus Schenck, 1852

Donisthorpe, 1927; Stitz, 1939.

A. atratulus is very sporadically distributed, occurring here and there within the range of its host *Tetramorium caespitum*.

Solenopsis fugax (Latreille, 1798)

Donisthorpe, 1927; Stitz, 1939; Bernard, 1946.

S. fugax is a Central European species reaching its northern limit on the south coast of England where it is rare and on the islands of Öland and Gotland in the Baltic but not the Scandinavian mainland. In South Europe it is replaced by a number of similar species (Bernard, 1946).

Myrmecina graminicola (Latreille, 1802)syn. *M. graminicola* r. *götlandica* and *M. graminicola* r. *oelandica* Karawaiev, 1930; Stitz, 1939.

M. graminicola occurs widely throughout Central and South Europe extending northward to England, the Low Countries and South Sweden. It appears to be an unique and uniform species throughout its range which includes the mountains of North Africa.

Sifolina sp. Emery, 1909*S. pechi* Samšínák, 1957; Pisarski, 1962.

S. pechi is a parasitic species originally described by Samšínák (1957) from Czechoslovakia; Pisarski (1962) also found this species with *Myrmica rugulosa* in Poland. Prof. J. van Boven has discovered a similar parasite which may be of this genus in Belgium (pers. commun.) and Dr M. V. Brian has taken examples in a nest of *M. scabrinodis* in South England which also appear very similar to Pisarski's description of *S. pechi*. In general appearance the males and females resemble very small *Myrmica rugulosa* but the middle and hind tibiae lack pectinate spurs, the

(1) Yarrow (1968) has recently described the British species as *Sifolinia laurae* Emery

rather variable wing venation is not of *Myrmica* type, while the petiole nodes are somewhat swollen with ventral projections which seem to be characteristic of several parasitic and semi-parasitic genera.

Formicoxenus nitidulus Nylander, 1846

Donisthorpe, 1927; Stitz, 1939.

F. nitidulus occurs throughout the range of its hosts which are wood ants of the *Formica rufa* group from the Eastern Pyrenees up as far as the north Baltic in Scandinavia and eastwards into Siberia.

Epimyrma goesswaldi Menozzi 1931

Menozzi, 1931; Stitz, 1939.

E. goesswaldi occurs with its hosts *Leptothorax tuberum* and *L. unifasciatus* in Central Germany including locations that are a few miles north of latitude 50° (Wolf, 1949) (Gosswald, 1951).

Harpagoxenus sublaevis Nylander 1852

syn. *H. sublaevis* v. *hirtula* Nylander, 1852.

Stitz, 1939; Holgersen, 1942.

H. sublaevis is associated with both *Leptothorax acervorum* and *L. muscorum*. It is quite common in Scandinavia (Holgersen, 1940) but is also widely if sparsely distributed into Central Europe, the Alps and Pyrenees.

Leptothorax acervorum (Fabricius, 1793)

syn. *L. acervorum* v. *nigrescens* Ruszky, 1905; Holgersen, 1945; Collingwood, 1964; nec Petal, 1963; Stitz, 1939.

L. acervorum is one of the commonest ants of North Europe and occurs right up to the north coast of Norway. At the northern edge of its range and in bog areas of Scandinavia and Eastern Europe, colour is often very dark. Holgersen (1944) however, did not consider that there was sufficient constancy to distinguish this population as Ruszky's dark form, *nigrescens*. More recently, Petal (1963) has attempted to restore this name as a biotopic subspecies but as with *M. scabrinodis* variability is too great and real distinctions too slight to justify a taxonomic distinction. Melanism in ants as with many other insects is frequently a response to cold, inferior nutrition and long drawn out larval development.

Leptothorax muscorum (Nylander, 1846)

Stitz, 1939; Buschinger, 1966.

This species does not occur in the British Isles although it is widely distributed through Central Europe ranging northwards to about latitude 63° in Norway, Sweden and Finland.

Leptothorax gredleri (Mayr 1855)

Buschinger, 1966.

This was long regarded as a minor variation or synonym of *L. muscorum*. However Buschinger (1966) has re-established the species on its larger body size, shorter epinotal spines and other more variable characters in sympatric populations with *L. muscorum* in Central Germany.

Leptothorax nylanderi (Foerster, 1850)

Donisthorpe, 1927; Stitz, 1939.

This species is common in the woodlands of Western Europe, being especially abundant in North and Central France and extending northwards into South England where it is widely distributed. It occurs locally in South Sweden but has not been found elsewhere in Scandinavia.

Leptothorax corticalis (Schenek, 1852)

Stitz, 1939.

This is a rare Central European species with an apparently very sporadic distribution with isolated refugia as far north as Vastmanland in Sweden many hundred miles from its nearest known locations in Germany and Poland.

Leptothorax affinis Mayr, 1855

Stitz, 1939.

L. affinis occurs locally in North Germany and Poland. As with *L. corticalis* and *L. nylanderi* it is a tree inhabitant, becoming quite common in France and Switzerland where it is characteristically associated with walnut.

Leptothorax clypeatus Mayr, 1855

Stitz, 1939.

L. clypeatus is a relatively unknown Central European species, and appears to be quite uncommon. Stitz (1939) includes Belgium in its range but it is absent from Gaspar's list.

Leptothorax tuberum (Fabricius, 1775)

Donisthorpe, 1927; Stitz, 1939.

syn. *L. tuberum* v. *nigricephala* Karawaiev, 1930; Forsslund, 1955.

syn. *L. tuberum* v. *nigriceps* Mayr, 1855; Collingwood, 1964; nec Bernard, 1956; Boven, 1959.

(*L. tubero-interruptus* Forel, Betrem, 1950).

L. tuberum occurs throughout the mountains of Central Europe and northward into Scandinavia and is a characteristic inhabitant of rock crevices and stony soils. A number of colour forms have been named—*nigricephala* Karawaiev, from Öland and Gotland (Stitz, 1939), *nigriceps* Mayr from Europe as a whole including Scandinavia and *melanocephala* Emery from Southern Europe. Betrem (1926) records *L. turbo-interruptus* Forel from

the Netherlands but his illustrations include features — short epinotal spines and short truncate dorsal area of petiole node — which are characteristic of *L. tubereum*. Boven (1959) keys *L. nigriceps* from *tubereum* in his account of Netherland ants, chiefly on head colour which varies from pale yellow on the limestone cliffs of S. England, brown to dark brown in examples from E. Kent (Felton, 1965) and mostly dark but variable in continental specimens including those from Scandinavia.

Leptothorax unifasciatus (Latreille, 1798)

L. tubereum r. *unifasciata* Stitz, 1939.

L. unifasciatus Latr. Boven, 1959 et auctt. recentes.

L. unifasciatus is abundant in Central and South Europe, nesting both under bark and in rock crevices. It reaches its northern limits in Poland and the Low Countries and it is not found in Britain although not uncommon in Jersey and Guernsey.

Leptothorax interruptus (Schenck, 1852)

Donisthorpe 1927.

L. tubereum r. *interrupta* Stitz, 1939.

L. interruptus is interesting in that it is rather sporadic throughout Central Europe. In England it occurs locally in a rather well defined habitat of dry southern heath in Hampshire and Dorset (Collingwood, 1964) but has also occurred on the Hampshire coast and recently near Dungeness in Kent (Felton, 1965). In Scandinavia it has only been recorded with certainty on Öland and Gotska Sandön islands (Forsslund, 1957) and the only other record north of latitude 50° is that of Gösswald (1951).

Tetramorium caespitum (Linnaeus, 1758)

Donisthorpe, 1927; Stitz, 1939.

T. caespitum is one of the most abundant European species. In Britain, its distribution north of the southern English heaths is restricted to coastal areas but it extends into Central Sweden and Finland.

Strongylognathus testaceus (Schenck, 1852)

Stitz, 1939.

syn. *S. diveri* Donisthorpe, 1936; Brown, 1957.

S. testaceus lives in dulotic semiparasitic relationship with *T. caespitum* and is not uncommon throughout Central Europe. The British form was described as a separate species, *S. diveri* by Donisthorpe (1936) but is considered to be within the range of variation of the continental form (Brown, 1955).

DOLICHODERINAE

Dolichoderus (Hypoclinea) quadripunctatus (Linnaeus, 1767)
Bondroit, 1918; Stitz, 1939.

D. (Hypoclinea) quadripunctata is a southern tree inhabiting species which extends into the area covered by this list in Belgium where it is very rare and in Germany and Poland.

Tapinoma erraticum (Latreille, 1798)

Donisthorpe, 1927; Stitz, 1939.

T. erraticum v. *ambigua* Emery, 1925?

T. erraticum is abundant throughout Europe but not found in Scandinavia outside Öland and Gotland. *Tapinoma ambiguum* is regarded as a distinct species by Boven (1959) and by Kutter pers. commun. on a difference in form of the male genitalia. The female castes are, however, not distinguishable and insufficient material has been studied to establish the consistency of difference in the male to confirm the taxonomic distinction.

FORMICINAE

Camponotus fallax Nylander, 1856

C. (Myrmentoma) caryae Fitch v. *fallax* Nyl.
Stitz, 1939. *C. (M.) fallax* Pisarski, 1961.

C. fallax has a similar range to *H. quadripunctatus* in South and Central Europe, extending northward into Poland (Pisarski, 1961) but Forsslund rather unexpectedly found it in old oak trees together with *Leptothorax corticalis* on the north fringe of Lake Malaren in S. Sweden.

Camponotus herculeanus (Linnaeus, 1758)

Yasumatsu and Brown, 1951; Pisarski, 1961.

C. herculeanus is holarctic, its European distribution coincident with spruce, but it also occurs in the northernmost edge of coniferous forest in Scandinavia.

Campanotus ligniperda (Latreille, 1802)

Stitz, 1939.

C. herculeanus ligniperda Pisarski, 1961.

C. ligniperda is a similar species but with a more restricted range confined to Europe where it is slightly the more southern of the two, nesting in drier warmer situations. Pisarski (1961) regards *C. ligniperda* and *C. herculeanus* as races of one species but despite a tendency for colour overlap, they are quite distinct on pubescence characters. Neither species has ever established itself in the British Isles although often imported with Scandinavian timber and although recorded for the Low Countries in the past, they have now become either very rare or extinct there.

Camponotus vagus (Scopoli, 1763)

Stitz, 1939; Pisarski, 1961.

C. vagus is a southern European species which ranges northward into Poland (Pisarski, 1961) and there is also an old specimen from Gotland in the Baltic where it has not been found in recent years.

Camponotus (Myrmentoma) lateralis (Olivier, 1791)

Stitz, 1939; Pisarski, 1961.

Camponotus (Myrmentoma) picea (Leach, 1825)*C. piceus* Emery 1920*C. (M.) lateralis picea* Pisarski, 1961*C. (M.) piceus piceus* Urbani, 1964syn. *C. merula* Losana, 1834; Collingwood and Yarrow, 1968

C. lateralis and *C. picea* are both South European species which extend into Poland while the former also occurs just north of latitude 50° in Central Germany (Gösswald, 1951) and there is an old record for Prussia by Brischke in 1888 (Stitz, 1939).

Camponotus (Tanaemyrmex) aethiops (Latreille, 1795)

Stitz, 1939; Pisarski, 1961.

C. aethiops was taken by Bischoff in East Poland as the colour form *marginata* Latreille (Pisarski, 1961). Urbani (1964) gives specific rank to this form on grounds of consistency of colour but no morphological difference has been suggested.

Colobopsis truncata (Spinola, 1808)*Camponotus (Colobopsis) truncata* Spin. auctt.

Stitz, 1939; Gösswald, 1951.

C. truncata was recorded by Gösswald (1951) just north of latitude 50° in Central Germany but this also, together with the three species above, is a decidedly southern species and not characteristic of the North European fauna.

Plagiolepis pygmaea (Latreille, 1798)

Stitz, 1939; Gösswald, 1951.

Plagiolepis vindobonensis Lomnicki, 1925

Lomnicki, 1925; Stitz, 1939.

P. vindobonensis listed by Gaspar (pers. commun.) for Belgium and *P. pygmaea* recorded by Gösswald for Germany are xerophytic species abundant in dry rocky limestone pastures in South Europe.

Lasius niger (Linnaeus, 1758)

Stitz, 1939; Wilson, 1955.

L. niger is holarctic. It ranges from the north Baltic southwards throughout Europe where it is probably the most abundant species.

Lasius alienus (Foerster, 1850)

Stitz, 1939; Wilson, 1955.

L. alienus has a similar range but does not occur so far north as *L. niger*. In Europe it is a dry pasture and sand land species but according to Wilson (1955) the north American equivalent which he considers conspecific, lives in shaded woodland.

Lasius emarginatus (Olivier, 1791)

Stitz, 1939; Wilson, 1955.

L. emarginatus is locally abundant in the warmer valleys and town gardens of Central and South Europe extending into North Germany and Poland.

Lasius brunneus (Latreille, 1798)

Stitz, 1939; Wilson, 1955.

L. brunneus follows the oak wood belt in North Europe including Sweden although more or less restricted in South England to the lower Severn and Thames valleys.

Lasius (Cautolasius) flavus (Fabricius, 1781)

syn. *L. flavus* v. *myops* Forel, 1894; Wilson, 1955.

L. flavus myops Forel; Boven, 1955; Kulmatycki, 1920; nec Wilson, 1955.

L. flavus is extremely abundant in Britain and West Europe but becomes less common in Scandinavia where it is restricted to valleys and coastal districts. Boven (1959) among other European authors distinguishes *L. myops*, a small form with reduced eyes, but according to Wilson (1955) this is a normal allometric variation of *L. flavus* in southern areas. Conversely it is common to find *L. flavus* colonies in marginal northern areas with large brown macrergate workers, a phenomenon probably associated with slow brood development in cool climates.

Lasius (Chthonolasius) mixtus (Nylander, 1846)

Wilson, 1955; Collingwood, 1963.

L. umbratus is generally distributed through North Europe as far as Central Sweden.

Lasius (Chthonolasius) rabaudi Bondroit, 1918

Wilson, 1955; Collingwood, 1957.

L. rabaudi is similar but becomes relatively more common in South Europe. In England and Sweden it is an inhabitant of coastal fixed dunes and dry lowland heath.

Lasius (Chthonolasius) bicornis (Foerster, 1850)

Wilson, 1955.

L. bicornis is rare and sparsely distributed through Centre and South Europe. It has occurred in both Belgium and the Netherlands and also once in South Sweden (Forsslund, 1949) and in the Baltic states.

Lasius (Chthonolasius) affinis (Schenck, 1852)

Boven, 1955; Collingwood, 1963; nec Wilson, 1955.

L. affinis is a similar species but with larger queens and males. It is also sporadically distributed through Central Europe and has been recorded from one location in the Netherlands (Boven, 1955) and also from Poland. This species was re-established (Collingwood, 1963) following synonymy under *L. umbratus* by Wilson (1955) from clear and consistent morphological differences in the female castes.

Lasius (Chthanolasius) mixtus (Nylander, 1846)

Boven, 1959; Collingwood, 1963; nec Wilson, 1955.

L. mixtus was also synonymised by Wilson (1955) because of apparent continuous allometric variation from the '*mixtus*' form to the extreme hairy '*umbratus*' form. This has not been accepted by European authors including Boven (1959), Forsslund (1957) as in its North European range at least, populations fall into one or other category with distinctive recognisable differences in the great majority of cases. Both species appear to occupy very similar ranges in Europe but *L. mixtus* is relatively more abundant in northern peripheral areas including Ireland, Scotland and Scandinavia.

Lasius (Austrolasius) carniolicus (Mayr, 1861)

Wilson, 1955.

L. carniolicus has been taken on Gotland and in Poland (Wilson, 1955) but is not otherwise known in Europe north of Switzerland.

Lasius (Dendrolasius) fuliginosus (Latreille, 1798)

Stitz, 1939; Wilson, 1955.

L. fuliginosus more or less follows the range of *L. mixtus* and *L. umbratus* in North Europe but does not occur in Scotland and is rare in Finland and Norway.

Formica exsecta Nylander, 1846.

F. (Coptoformica) exsecta Stitz, 1939; Kutter, 1957; Dlussky, 1963.

F. exsecta is widely distributed from the mountains of South Europe to well within the Arctic Circle in Scandinavia where it is very abundant especially in the large zone of scrubby, boggy woodland in the north of Sweden and Finland. In these areas

nest samples are considerably more hairy than those from coastal districts and the milder south including the British Isles. Betrem (1957) has tentatively proposed to distinguish such examples from Finland under the name *kontuniemi* Betrem but general evidence from collected material over a wide range suggests that increasing hairiness from south and west to north and east may be a clinal trend without break into two distinct populations and Dlussky (1964) does not accept this name in his revision of the *Coptoformica*. It is curious that in Britain the Scottish Highland location of this species are some 800 km. distant from the only known location in England in the south and southwest, a wide separation which is not characteristic of the British Formicidae as a whole. Although climatically and geographically widely separate there is no apparent morphological difference between the two populations (Yarrow, 1955).

Formica pressilabris Nylander 1846

F. (Coptoformica) pressilabris Stitz, 1939; Kutter, 1957; Dlussky, 1963.

F. pressilabris does not range so far west or north as the preceding but is not uncommon from Central Scandinavia to the Swiss Alps.

Formica suecica Adlerz, 1902; Forsslund, 1949.

F. (Coptoformica) suecica Stitz, 1939; Holgersen, 1944; Pisarski, 1964.

F. suecica appears to be an endemic Scandinavian species, only known from Norway, Sweden and Finland.

Formica forsslundi Lohmander, 1949

F. (Coptoformica) forsslundi Kutter, 1957

syn. *F. (C.) nemoralis* Dlussky, 1964

F. (C.) forsslundi ssp. *strawinskii*, Petal, 1962

F. forsslundi is a species of the northern coniferous forest bogs. It ranges from Norway (Collingwood, 1963) through Sweden, Finland and North Russia and also occurs in Poland while Kutter (1957) took it in one locality in Switzerland. The Polish form was described by Petal (1962) as a subspecies *strawinskii* on a variety of small differences in head and scale shape, etc. The reality of this form will be in doubt until a study of the normal variation in the species is made. Dlussky (1964) described the Russian population under the name *nemoralis* which becomes a synonym (Dlussky, pers. commun.).

Formica sanguinea Latreille, 1798

F. (Raptiformica) sanguinea Stitz, 1939.

Formica sanguinea Barrett, 1964

F. sanguinea is the widest ranging species of the whole genus of *Formica*. It occurs from Central Spain to the Himalayas in the

south to well within the arctic circle in Norway and Sweden across to Siberia, enslaving the various species of the *Formica fusca* group appropriate to each area.

Formica uralensis Ruzsky, 1895

Stitz, 1939; Forsslund, 1957; Petal, 1963.

F. uralensis was originally described from the steppes of Central Russia but occurs as a typical forest bog species in the Baltic and Scandinavia. Bisgaard (1944) suggests that adaptation to bogland conditions may have come about through competition from other large *Formica* species which are absent from the relatively arid areas where *F. uralensis* flourishes in East Russia and Mongolia. The species is not uncommon in Finland and Sweden, occurs also in Karelia, the Baltic states and Poland (Petal, 1963), has been found in one locality in Denmark and also in Switzerland in the same area where *F. forsslundi* was found.

Formica truncorum Fabricius, 1804

Stitz, 1939.

F. truncorum occurs from the Arctic to Central Europe and eastwards into Siberia. It is not uncommon throughout the Scandinavian countries and in parts of North Germany but does not occur in Belgium, the Netherlands or elsewhere in Europe west of the Vosges and Alps (Kneitz and Emmert, 1962).

Formica rufa Linnaeus, 1758

Yarrow, 1955; Betrem, 1962.

F. rufa is the common boreal wood ant of Europe and North Asia. It occurs northward as far as Central Sweden and the fjords of S. Norway.

Formica polyctena Foerster

Betrem, 1962; nec Yarrow, 1955.

F. polyctena is a somewhat more southern form, closely allied to *F. rufa*, occurring locally in South Scandinavia and more abundantly in the Low Countries. The above three species are characteristically polycalic and polygynous but there is also a form morphologically indistinguishable from *F. rufa*, known as *F. piniphila* Foerst. which is monodromous and apparently monogynous that behavioural evidence suggests may be a separate species in Sweden, North Germany and the Netherlands.

Formica aquilonia Yarrow, 1955

Yarrow, 1955; Betrem, 1962.

F. aquilonia replaces *F. rufa* as the main forest wood ant in the spruce forests of Scandinavia, mountain areas and the north.

Formica lugubris Zetterstedt, 1840

Yarrow, 1955; Betrem, 1962.

syn. *F. truncorum* v. *truncicola-pratensis*

Forel, 1874; Nov. Syn.

F. lugubris is a northern species, found from the arctic fringes of northern forest to the southern tip of Norway and Central Sweden and also abundantly in the higher woodlands of the Alps and Pyrenees.

Formica pratensis Retzius, 1783

Kutter, 1964; Betrem, 1965.

syn. *F. nigricans* Emery sensu Yarrow, 1955.

F. pratensis Retzius has been resuscitated by both Kutter (1964) and Betrem (1965) as the accepted name for the species known since Yarrow (1955) as *F. nigricans*. It nests in more open sun exposed sites than *F. rufa* and reaches its northern limits at about latitude 63° in Sweden and Finland.

Formica nigricans Emery, 1909syn. *F. cordieri* Bondroit, 1918syn. *F. pratensis* v. *ciliata* Ruzsky, 1905

Kutter, 1964; Betrem, 1965; nec Yarrow, 1955.

F. nigricans has been known in the literature of recent years as *F. cordieri* Bondroit which now sinks as a synonym (Betrem, 1965). It is distinguished from *F. pratensis* in the male and queen castes by longer body and appendage hairs but workers of the two presumed species cannot be separated. *F. nigricans* is the more southern of the two reaching well into the Apennines in Italy where *F. pratensis* is so far unknown. It is not uncommon in South Sweden, local in Denmark and occurs in an aberrant form in one area of the Netherlands. It becomes more common in France where it reaches the Mediterranean border.

Formica fusca Linnaeus, 1758.

Yarrow, 1955.

Formica lemni Bondroit, 1918

Yarrow, 1955.

F. fusca is the common black ant of Central Europe. It gives place to the very similar *F. lemni* in the higher mountains, in the north-western hills and more exposed areas of Britain and approximately north of latitude 64° in Sweden and Finland.

Formica rufibarbis Fabricius, 1793.

Yarrow, 1955; Dlussky, 1964.

F. rufibarbis is another common wide ranging species, very local in South England but with only a slightly more southern distribution than *F. fusca* in continental Europe and Scandinavia.

Formica cunicularia Latreille, 1798

Yarrow, 1955.

syn. *F. glebaria* v. *rubescens* Forel
nec Gaspar, 1965.

F. cunicularia is more scarce than *F. rufibarbis* in Scandinavia where it is only known from South Sweden and very locally in Denmark but becomes more abundant westward into France and South Britain. Gaspar (1965) uses the old name *rubescens* for the red form of this species but Yarrow (1953) could find no morphological distinction between the colour forms.

Formica cinerea Mayr

Stitz, 1959.

F. cinerea is an interesting species of sandy riversides in Central Europe that has a surprisingly northern distribution into Denmark, Sweden, Norway and South Finland. In continental Europe it is not found in the Low Countries or North Germany west of Brandenburg but becomes locally abundant again in parts of Normandy in France.

Formica cinereorufibarbis Forel, 1874*F. cinerea* v. *cinereo-rufibarbis* Forel?

This is a rather large brownish red species in the *F. cinerea* complex. The name is probably invalid since Forel's types in the Geneva Natural History Museum are all identifiable as rather small specimens of *F. rufibarbis* Fab. However, both Pisarski (1953) and Dlussky (1966) use this name for the present species which has occurred in S. Russia, Roumania, Italy, Switzerland, Austria and Poland.

Formica gagatoides Ruzsky, 1904*F. picea* Nylander v. *gagatoides* Ruzsky.

Holgersen, 1940; Dlussky, 1965.

F. gagatoides is an arctic Siberian species, abundant in North Finland, North Sweden and the mountains of Norway (Holgersen, 1943), but quite unknown in Europe south of these countries.

Formica transcaucasica Nasonowsyn. *F. picea* Nylander, 1846, nom. praecox.

Yarrow, 1955; nec Dlussky, 1965.

F. transcaucasica has also been known as *F. picea* Nylander, a name still used by some authors, e.g. Dlussky (1965) but *F. picea* Leach antedates Nylander's name and is assigned to a *Camponotus* species—*C. picea* above. *F. transcaucasica* is a bog inhabitant in North and montane Europe but with a wide distribution into Mongolia and the Himalayas where it nests on more arid sites. It shares with *F. uralensis* the same puzzle of being almost entirely restricted to boggy terrain in Europe, adapted to a very different biotope in Asia.

Polyergus rufescens (Latreille, 1798)

Stitz, 1939.

P. rufescens has been taken as far north as Stockholm in Scandinavia but is essentially a southern species only found very locally north of latitude 50°.

It will be seen that several species can be regarded as atypical for the southern fauna since they have their main distribution well to the south of latitude 50°. The inclusion of Poland and North Germany in particular has brought in a number of such species including *Aphaenogaster subterranea*, *Plagiolepis pygmaea*, *Camponotus lateralis*, *C. picea*, *C. aethiops* and *Colobopsis truncata*. On the other hand, there is no natural or other boundary that can fully separate what can be regarded as typical northern species from those of the south. Thus on the Swedish mainland such ants as *Leptothorax corticalis*, *Camponotus fallax*, *Lasius bicornis* and *L. carnolicus* have been found far to the north of their nearest known locations in continental Europe; on the Baltic Islands of Öland and Gotland there are certain species absent from that latitude on the mainland while in the British Isles such species as *Ponera coarctata*, *Solenopsis fugax* and *Leptothorax interruptus* are at the fringe of their distribution. Some of these occurrences such as the presence of *Formica cinerea* Mayr. about latitude 60° in Norway and Sweden, can be regarded as relicts in xerothermic islands from the post glacial climatic optimum or boreal period when the north European summer climate was 3°C warmer than at present and the range of such species was presumably well north of the present limits. There is some supporting evidence for this from studies on insect fragments in recent peat, where, for example, remains of the weevil *Dryophthoris corticalis* have been identified in North Warwickshire deposits, dated about 7,000 years ago (Osborne, 1965) some 70 km north of its only known location in Britain now, in Windsor Forest, Berkshire, where it is associated with *Lasius brunneus* in old oak trees.

However, a species can only exist where an environment continues to remain favourable. Records over the last century from the British Isles suggest a certain stability in this respect. As examples, *Solenopsis fugax* was recorded from E. Kent by Smith (1865) and rediscovered in the vice county by Felton, 1965; *Formica rufibarbis* has been known only for a limited area of heathland in Surrey for the past 70 years; *Myrmica schencki* collected in Warwickshire in 1893 (Pontin, 1962) was rediscovered in the county by Barvett in 1964. *Lasius alienus* very local in Ireland, has occurred in a restricted area of Howth Head, Dublin for at least 40 years and there are many similar examples. Some species are diminishing through alteration of environment by human activity. Thus *Formica pratensis* known in the Bournemouth area up to 1925 (Donisthorpe, 1927) has been obliterated

by housing development, whereas the species still continues in a small area of relatively unchanged Dorset heathland and Gösswald (1951) records the apparent disappearance of *Plagiolepis pygmaea* from the Main river neighbourhood in Germany for similar reasons.

Conversely certain common species notably *Lasius niger* and *Tetramorium caespitum* are probably increasing their range northward especially in the West European coastal belt. From the conservation point of view, it is fortunate that so much of Scandinavian Europe still includes large areas of forest bog but drainage, dense canopy plantations or other developments for economic reasons could soon obliterate such interesting species as *Formica forsslundi* and *F. uralensis*. Some of these areas in Finland and Sweden are set aside as Nature Reserves but there is perhaps scope for an extra-national policy for preservation of the more specialised elements of the fauna of Northern Europe.

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FIELD NOTES FROM EAST AFRICA XV

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MIGRATION OF *ANAPHEIS AUROTA* F. (LEPIDOPTERA, PIERIDAE). A large flight of this species took place on 13.ii.70. The butterflies were moving from approximately SSW to NNE, the wind was from the NE. The last migration recorded here was in March 1964. A friend reported seeing vast swarms between Mackinnon Road and Voi, some fifty to a hundred miles north west of Mombasa on 16.ii.70. It is difficult to estimate how long the flight lasted as the 14th and subsequent mornings were dull and cloudy, and very few butterflies were on the wing. On 21.ii.70, the first really sunny morning, there were none flying.

N.B. Unless otherwise mentioned, all records refer to Nyali, a residential area on the mainland immediately north of Mombasa Island.